DOCUMENT RESUME

ED 261 667 IR 011 817

AUTHOR Simpson, Margaret
TITLE Professional Autonomy and Specialized Knowledge: Computers in the Classroom.
PUB DATE [85]
NOTE 37p.
PUB TYPE Information Analyses (070) -- Viewpoints (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Literacy; Instructional Innovation; *Interprofessional Relationship; *Microcomputers; *Professional Autonomy; *Teacher Effectiveness; Teacher Qualifications; Teacher Response
IDENTIFIERS *Computer Uses in Education; Quebec

ABSTRACT

This paper examines the cultural and philosophical roots of competing interests in the proliferation and implementation of computers in the schools of Quebec, Canada, and specifically addresses the effect of this technology on teacher autonomy, professionalism, and the learning/teaching experience. In particular, it considers the implications for education of the creation of a professional duality, where the computer literate teacher is deemed to be a higher order professional; and the implicit assumptions that worthwhile knowledge is necessarily synonymous with the higher order technology. It identifies the effects (if any) of the introduction of computers on the immediate environment of peer relationships among teachers; examines the effect of the introduction of computers on the technical knowledge base and the management of the technical base in the classroom; and analyzes its effects on the autonomous dimension of professional attitudes. Also discussed are implications for the teaching profession and for students of the overuse of technology to the exclusion of humanistic values and the human experience. A three-page bibliography concludes the document. (JB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

SCOPE OF INTEREST NOTICE

The ERIC Facility has assigned this document for processing to:

In our judgment, this document is also of interest to the Clearinghouses noted to the right. Indexing should reflect their special points of view.

ED261667

Professional Autonomy and Specialized Knowledge: Computers in the Classroom

Margaret Simpson

IR011917

BEST COPY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

~~Margaret Simpson~~

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Introduction

While controversy over the definition and/or recognition of teaching professionalism has continued for many decades, the formal framework within which the teaching profession can be examined is divided into two dimensions: structural and attitudinal (Macklin, 1981). Richard Hall in his classic work on the measurement of attitudinal components of professionalism outlined five aspects for assessing teacher professionalism: use of professional organization as a major referent, belief in public service, belief in self regulation, sense of calling to the field, and a feeling of autonomy (Snizek, 1972). Further research on the attitudinal dimension of professionalism concludes that "the most single important factor affecting teachers' mentality still resided in their immediate working environment as peer relationship measured by group characteristics in school, affected profoundly from four out of five dimensions of professional attitude" (Lam, 1979, p. 168)

Macklin focuses on the last of Hall's categories: autonomy. He states, "If this autonomy is to be used responsibly, then teachers must be capable of operating in a complex and constantly changing social interactive situation where rule following is inadequate" (Macklin, 1982, p. 29). He proposes four dimensions of teaching in order to specify its professional elements: 1. basic concepts, assumptions, and beliefs employed in teaching; 2. the designation of worthwhile knowledge; 3. the technical knowledge base; and

4. the management of the technical base in the classroom. He observed, quoting Brown (1968), "Intelligent evaluation and clarification of the vast jungle of teaching practices is possible only if the concealed cultural and philosophical roots of the competing interests in the controversy are raised to the level of consciousness and are opened for public inspection. This requires teachers to make a serious effort to identify the values they use as guiding principles in making judgements about teaching practice" (Macklin, 1983, p. 30).

Teaching practice and technical knowledge base have assumed new significance as a result of the "technological revolution" our schools are now undergoing. There are over 350,000 computers in place in U.S. schools (Bradley, 1984), and predictions indicate that every student will have his own computer by 1990 (Papert, 1980). Educators are not unanimous in this acceptance of computer universality. Some observe that "it is a passion not likely to be sustained by a sizeable part of the population, out of school or in." (Bradley, 1984, p.21). Others, more numerous, would agree with John Levin that "a rejection of this technology, or at least a rejection of what can be learned from it, will limit the social relevance of Canadian institutions of higher learning" (1984, p. 84)

This paper proposes to examine the cultural and philosophical roots of the competing interests in the

implementation and proliferation of computers in our schools. It will attempt to identify the effects (if any) of this introduction on the immediate environment of peer relationships among teachers; to examine the effect of the introduction of computers on the technical knowledge base and the management of the technical base in the classroom; and thereby to analyse its effects on the autonomous dimension of professionalism attitude. In particular this paper will consider the implications for education by the creation of a profesional duality where the computer literate teacher is deemed to be a higher order professional; and the implicit assumptions that worthwhile knowledge is necessarily synonymous with the higher order technology.

I. Professional Autonomy

What Constitutes Autonomy for the School Teacher?

In an exemplar context the characteristics essential for a valid profession, the specialized knowledge required to practice, control of entry to the profession, formulation of ethical code, and the freedom to practice without lay interference, would occur in balanced unison (Musgrove, 1965). Prestige and autonomy would "flow naturally from the cognitive and normative bases of professional work" (Larsen, 1981, p. xi). Variations of these characteristics are numerous, especially between the traditional professions such as medicine and the 'para' professions such as teaching; but some element of them remains common to both (Esland and Salaman, 1980). Autonomy, the right of a group to control its own work, has been proposed as the basis for the distinction of a profession from other occupations (Freidson, 1970).

The element of autonomy varies not only from profession to profession, but in reference to teaching, within the profession itself. While the profession of teaching demands of its practitioners both high ethical standards and exact qualifications, teachers do not enjoy the corresponding freedom to practice as their own members dictate. Very few, if any, professional teachers in the Quebec school system are independently

employed. When an entire profession is employed by the state, the profession begins to resemble a body of experts employed by a patron (Musgrove, 1965). It has been argued that when teachers are placed in the position of simply selling their labour, proletarianization is the result and the profession as such no longer exists (Oppenheimer, 1980).

This dependence upon the state has resulted in the erosion of traditional control and in the use of advisors who are laymen to the teaching profession to proscribe the conditions of service. While both medicine and teaching in the province of Quebec are government controlled; direct interference is far more pervasive in education. Teachers have virtually no autonomy over curricula, the Department of Education sets curricula and dictates its implementation, but they do enjoy wide freedom for individual practice within the contemporary norms relating to curricula and pedagogy.

How Autonomy is Achieved

Within the complex social system of the classroom, with its constantly changing relationships and activities, the teacher may practice almost total autonomy over certain areas. While the legitimacy for this autonomy and for the teacher's presence in the classroom is rooted in the specialized knowledge of the teacher, the

BEST COPY AVAILABLE

achieving of this autonomy in practical terms has a more pedestrian base.

The most obvious manifestation of the teacher's authority is the myriad administrative decisions governing everything from the physical properties of the classroom to student/student, student/teacher interaction and deportment in the classroom. The teacher is free to establish his own personal conditions of work, albeit within the normative curricula framework, for the larger part of his working day. He is free to affect the student hierarchy among the students which, of necessity, must exist for the management and control of a classroom full of children. It is his judgement which decides who is a gifted student and who is a slow learner; who will get more teacher time and who less, i.e. the state of social control within his class (Musgrove, 1965).

Students learn to accept the teachers right to dominate the classroom verbally. Studies have demonstrated that two thirds of all time in classrooms is spent talking and two thirds of that time is spent in teacher talk (Delamont, 1976). In the methods and applications of learning the teacher is almost totally free. While it is true that as the child grows older, he will be better able to negotiate with the teacher on classroom management, the teacher will continue to emphasise his

own ideology to develop in the student the attitude that most nearly matches his own. The teacher's role in developing the child's perspective on school cannot be overestimated. Studies show that by secondary school, students have "very largely accepted the map and methods of learning offered by their teachers" (Musgrave, 1973, p. 250, emphasis added).

When a reflective choice is to be made in a new or problematic situation, teachers base their solutions on their present teaching viewpoint and overall philosophy. But many of these day-to-day decisions concern not substantive content but the management connected with it. Boydell (1974) demonstrated in an analysis of 'teacher talk' in the classroom, only one quarter of the conversation addressed content. The other three quarters of teacher conversation was about the children's activities.

The teacher attempts to orchestrate a learning situation by enforcing within the classroom his own outlook, values and perspectives. He does this by dictating a series of particular standards pertaining to the use of space, time and resources. He defines which interactions are acceptable between students and between students and teacher. He decides not what the content will be, but certainly the way in which it is taught. The teacher measures his success by whether or

not his students are conforming to his blueprint for the classroom. "Inevitably the reputation of any teacher, particularly among his peers, is very dependent upon the success that he achieves in controlling his own classes" (Musgrove, 1965, p. 254). Inasmuch as he is successful he will be left alone to enjoy his classroom autonomy. Otherwise he will be subject to the interference and dictates of his superiors. The ability to cope successfully with the constantly changing permutations of classroom interaction is the way in which autonomy is achieved.

The Effect of Specialized Knowledge on Autonomy

Fundamental to the definition of profession is the body of specialized knowledge upon which it is based. The ignorance of the consumer is inherent in his consultation of a professional. The members of any profession must develop certain knowledges, skills, and techniques unique from any other occupational group. While there are many commonalities of knowledge, the individuality of application is peculiar to the specific profession. In all professions the current practice to ensure the competency of those entering the profession, a formal, scholarly program of preparation is demanded.

In the province of Quebec, teachers are required to

have a minimum of a bachelor's degree and government certification in order to teach. While the state as the main employer is involved in specifying certain standards of knowledge and skill, teaching preparation remains vested in university programs. However, teachers or their representatives are not themselves responsible for control of entry since the system is operated by the Department of Education through administrative regulations.

The teaching profession also differs from the traditional professions because of the difference in the clientele served by teaching. Teachers have a captive clientele which has little effect on the development of the service offered to it. "Very rarely does the consumer, whether he is defined directly as the pupil or indirectly as his future employer or his parent, have much influence" (Musgrove, 1965 p. 170).

For autonomy to exist, every teacher must function in a dual role: as a practitioner, but also as a responsible member of his profession (Sennet and Huggett, 1963). Every profession, and teaching is no exception, must be constantly concerned with the quality of university programmes that prepare its members, if reasonable standards are to be maintained. The specialized knowledge base must be protected and maintained or the profession forfeits its reason for

existence.

Evaluation of their preparation programmes by teachers indicates that as a group they believe mastery of subject matter is important (Lortie, 1975). However, it must be emphasised that teachers believe that their work is complicated and difficult and that it requires more than subject matter. In a national study conducted by the National Education Association in the United States (NEA, 1967), a large majority of teachers expressed satisfaction in the amount of time spent on substantive study, both in general work and their area of specialization. They were considerably more critical of the practical instruction they received and this will be considered later in the paper.

Intelligence, training, and the master of a body of relevant knowledge are required to become a professional. While recent modern developments (mass media, advertising, etc.) have shown that they can sometimes teach some things better than many teacher, "it is still true that to practice as a teacher assumes a core of specialized knowledge and skills, and that a relatively high level of intelligence is needed to be a teacher." (Musgrove, 1965, p. 170).

The Role of the Computer in Specialized Knowledoe

Change is inescapable in education. At the present time the technological revolution has culminated in an administrative stampede to provide our students with computers. Teachers of necessity, and in some cases for survival, must begin to examine the parameters of this action to understand what is changing and in what direction is the movement.

Recent literature suggests that computers will feature prominently in education, allowing children to learn to think in new computer-like ways (Winin, 1984). The net result of this learning will be that in a computer culture, people might become systematic before they become quantitative and, the author concludes, we ignore this at our peril. Demands for training of teachers in computer literacy are legion (Bruce, 1984, Colin, 1984, Krull, 1984) and vary from the simple and vague expedient of ensuring all teachers can use the computerues. It is difficult to argue against the fact that certain kinds of individualized learning will soon be far easier to implement, "with the computer acting as either an educational instructor or manager, or just providing assistance" (Welford, 1984, p. 49). But it is equally difficult to deny the observation that to date, computers are used to further entrench learning objectives and that they are adaptations that serve curricula that are product oriented and divided into discrete units for efficiency (Leyin, 1984).

Constant discussion of change has methodological implication: it can create the impression that fundamental alterations have already taken place. But has there been, in fact, a cultural change, an alteration in thought about practice? Some writers (Landry, 1984) argue that this seemingly unquestioning acceptance of the importance of computers in teaching is the result of confusing the best interests of students and education with short-term economic and political advantage on the part of the proponents. Computer technology should be used to relieve the teacher of routine, time consuming tasks to enable them to concentrate on more innovative work. But perhaps more damning is the observation that control of the curriculum and deskilling of the work of the teacher are exemplified in the wide use of systems of pre-packaged sets of curriculum materials (Wylie, 1984). Advocacy of such prepackaging is increasing with the proliferation of computer systems. Certainly if reliance on this type of material increases, the relevance of the academic specialized knowledge of the teacher will diminish not withstanding the observation that, "We must remember that, while we may train students in the use of tools, we teach human beings. The former task is explicit and highly deductive; the latter, a multifaceted human interaction of greater and more important complexity." (Landry, 1984, p. 121).

Teachers see themselves as problem solvers. The ability to suggest and to try to find the best course of action depends on a teacher's knowledge, experience, creativity, and freedom to make decisions in light of the values held by himself and the community. If our society still believes that one of the indices of a professional person is his ability to use his education and experience to make critical judgements or choices regarding problem situations that arise, we must examine more carefully the use of school computers.

II. Technical Knowledge Base in the Classroom

What Constitutes Technical Knowledge Base?

While, as has already been discussed, the teacher does not enjoy autonomy in choosing the curriculum, his autonomy is almost absolute in the curriculum-planning activities of the classroom. Within the teaching-learning situations he directs, he is constantly forced to make critical judgements and choices. Five frames of reference can be delineated as the basis for teacher decisions: 1. definition of specific instructional objectives, 2. choice of and organization of subject matter items or centers of interest, 3. the choice of classroom activities or techniques, 4. choice of instructional materials, and 5. the determination of student progress in direct relation to the statement of instructional objectives (Harnack, 1968).

Recognition of these responsibilites is fundamental to professional teaching. The specific instructional objectives must be defined by the teacher. Failure to do so results in random wandering through a labyrinth of educational experiences. The accidental/incidental learning that would result would be totally unacceptable to any professional. It is precisely because the teacher is expert, that he knows what he wants to teach and can make judgements in his work that no one else can make, that he enjoys this form of autonomy. Given that the profession at

the secondary school level accepts that basic goals of the education system are defined by the community represented by the government, the teacher proceeds to exercise his professional freedom in specific teaching-learning situations. While laymen may determine the over-all function of the school, teachers define the specific instructional objectives which will in time accomplish the overall objectives defined by the community. This definition of subject matter, instructional material and instructional activity is a technical skill basic to teaching.

The choice of subject matter or other centers of interest demands the expert ability which qualifies the teacher as a professional. The teacher alone defines and organizes the subject matter content in order to fulfill the objectives. Whatever approach is decided upon, talking, reading, writing, etc., the activity must be directed towards something - that something and the way it is approached is the subject matter - and is solely the province of the teacher. This choice is not incidental or accidental but results from careful and informed thinking about the best approach to the teaching-learning situation. Such thinking revolves around many criteria which vary from the relevance of sequencing to the characteristics of the learner. It is the mastering of these criteria that constitutes the second technical base for effective teaching.

Daily decisions about teaching methods are fundamental for the teacher. Since classroom methodology is vital to the development of teaching/learning situations, teachers must be expert. The choice of technique is abundant. The choice among these methods is based on the knowledge and experience of the teacher together with his ability to consider specific purposes, pupils' characteristics, subject matter, and the availability of instructional material.

Inseparable from the methodology decisions are those made regarding classroom instructional materials. The teacher must choose from an already wide and ever-increasing availability of instructional materials. While the material must be related to subject matter, the teacher must also consider its relationship to the students themselves and the classroom techniques to be employed. He must be aware of the advantages and limitations of all the permutations and he must maintain an understanding of the latest developments in the field.

Determining student progress is a somewhat subjective undertaking and while greater emphasis is being placed on "scientific" results - i.e. what is measurable, it must be noted that what the student has learned and how he progresses is not always quantifiable in this way. The assessment of this non-quantifiable aspect of student development lies within the province of the teacher. It is his expertise and experience that enables him to make such a

judgement.

The controversy over the classification of teaching as a science or as an art has been debated for many years. But regardless of one's professed interpretation, either 'scientific' or 'intuitive', the teacher must master the techniques outlined above, then he must learn to manage them successfully.

Management of Technical Base in the Classroom

In the study conducted by NEA (1967) teachers in large numbers expressed dissatisfaction at the practical instruction they received. More than half said they had too little preparation in classroom management, routines and discipline. A similarly high percentage deplored the dearth of sufficient instruction in teaching methods (Hermanowicz, 1966). While respondents criticized their practical courses because they were lacking in content and usefulness, they were more approving of practice-teaching experience. Further studies on teacher training indicate that while education professors set high and difficult goals for their students they do not provide the means to achieve them (Lortie, 1975).

The teacher in the classroom must find ways of effectively managing the technical knowledge base in the classroom. Yet one of the ways education seems to progress is through

ideological change. The teacher is constantly confronted with 'new theories' which are normally advanced by discrediting former practices and outlooks. This repetitive discrediting of the past results in the lack of systematic codification of practical experience. A practice-oriented inquiry into problems and alternatives in the classroom has not been undertaken. The recording of cases together with the commentaries and critiques of highly trained professors allows new generations to profit from the experience of the old. The denial of this training to teachers results in a situation where the beginning teacher starts afresh, largely uninformed about prior solutions and alternative approaches to recurring practical problems. Their professional training has not linked recurrent dilemmas to available knowledge or to consideration of reality (e.g. cases, simulations).

This repudiation of past experience produces curricula which demand excellence but fail to cope with routine tactical and strategic problems. Teachers do not in fact share a technical subculture and do not view themselves as sharing one (Lortie, 1975). In the absence of this type of instruction they are forced to rely on individual reactions and interpretations and the small expertise they have developed during practice teaching.

Yet as we have already noted the ability to control his class and, we might add, the successful achievement of his

students is the criteria by which a teacher's reputation is made or broken. Such practice tends to produce teaching that is individual rather than collegial simply because there is no shared technique. The new teacher learns by trial and error, and he learns quickly or he does not survive. While the attrition rate of teachers is high (Lortie, 1975), the number of teachers who successfully develop effective management of the technical base in the classroom is impressive. But the isolation in which such knowledge is achieved and the incredible variety of the resulting techniques mitigates against the construction of a common occupational subculture. Nevertheless, it is upon this type of specialized knowledge that teaching autonomy is based.

The Effect of the Introduction of Computers on Technical Knowledge and its Management in the Classroom.

The effect of the introduction of computers on the technical knowledge base of teachers (and by extrapolation on autonomy) could be profound and cataclysmic if their introduction is not carefully examined. If computerized learning is to be implemented in ways currently being advocated in the literature (Papert, 1980), we are working towards the development of computer-like thinking in our students. That objective is clearly proposed. Teachers will no longer be called upon to define specific

instructional objectives.

The choice of subject-matter or areas of interest will be determined not by the multiplicity of vehicles for learning-teaching situations; talking, reading, making, etc., will become secondary to computing wherever possible. Some current work suggests that many classrooms do not serve as a social, interactive, communicative setting, and propose that microcomputers may be used to create the classroom's communicative context (Liebling, 1984).

The teacher will be relieved of making daily choices about methodology technique. The methodology is built into the computer. The decisions on whether to have group discussion, or to read aloud, or to have committee activities, etc., will no longer be necessary. All that will remain for the teacher is to maintain an understanding of the latest developments in software. For some proponents in the field this approach is still inadequate because it means that our schools are primarily using "concepts and skills from the last decade, in a time when we must prepare students for employment in the next decade" (Fischer, 1984, p. 22). The software, and by extrapolation the technical knowledge base, will be designed by someone other than the teacher.

Lastly and perhaps not unexpectedly, computer programs can be very exact in measuring student progress (albeit a

limited interpretation of progress). The computer is never in error, never biased, never judgemental. The computer is "scientific" in its assessment.

And so, in fact, if the universal implementation of computers becomes absolute and curricula built to depend upon them, the technical knowledge base of the professional teacher will change fundamentally. The teacher will no longer need to master successful management of the various techniques. If, as has been recently advocated, all schools have the same type of computer, and if they implement the standardization of software available because "every microcomputer should recognize the same school environment. And really that environment is not intrinsically different from that of the electronic office or the video arcade" (MUSE, Vol. 7, No. 1, 1984, p. 2), all prospective teachers will need to master is how to plug in the machine and what software to use. Teachers will only need to become computer enthousiasts who "like lovers contemplating the beloved - students and teachers alike - (will) spend endless hours gazing into the eye of the machine, enthralled with the subtelties of data processing, the nuances of programming languages" (Bradley, 1984, p. 21).

BEST COPY

In analysing the effect of computer based learning one cannot help but question why there is such enthousiasm for

an approach to the learning/teaching experience that strikes so forcibly at the basis of a teacher's autonomy. While there are many and various elements at work that are extrinsic to teaching, it is the attitude of the profession itself that concerns us here and it is in the consideration of the management of the technical base that the value to the teacher of computer based learning becomes apparent. Any teacher new or experienced has access not only to the same technical base but to the same management of that base. It is no longer necessary to develop a skillful pedagogy for the classroom. Once the student sits down at the computer, the steps of learning are programmed for him. Both subject matter and method are prescribed. He works at an individual level; the computer tells him when he is ready for the next level. The computer provides instant feedback on his progress. The computer's analysis of his work is instantaneous and inexorably correct.

If class management and control are the criteria upon which a teacher's reputation is based, then the computer is surely the philosopher's stone for teachers.

III. Power Base in Schools

Teacher Equality

While theoretically all teachers are equal, in actual practice a hierarchy among teachers already exists before they ever get to the classroom. From the time they are engaged to fill a position, their prestige is established. The higher the grade level; the more status. Even though the professional requirements for teaching in the province of Quebec are standard and universal for all grade levels, this bias is obvious and pervasive. In a recent article on the functional illiteracy of university students, one CEGEP teacher attributed the problem in part to teachers who are not well trained, and another is quoted in support by saying, "I met a teacher at X high school who was a kindergarten teacher, and she's been bumped into teaching grade eleven" (Buchigiani, 1985, p. 1, emphasis added). Teachers begin their careers in an already established order.

Once in the classroom as practitioners, teachers establish stratification within the school. Friedson has noted that within professions, a fairly clear awareness exists of differentiation between the levels of achievement and competence of different practitioners (Friedson, 1970). Teachers soon assess each other and classify accordingly. Since the cognitive functions of hierarchy are intimately connected with the way we solve problems, and the school is an organization structured precisely for solving problems,

it is not surprising that hierarchical structuring penetrates it so deeply (Burns, Karlson & Rus, 1979).

Work has already been done that establishes that the more esoteric the knowledge required by the job, the more the worker must learn, and the more likely it is that the importance of the working knowledge will be recognized both by the workers themselves and by others (Kusterer, 1978). The special academic knowledge of the teacher is what establishes one's entry into the hierarchy but it is the technical knowledge base and its management that is recognized by fellow workers and on which the internal status of a teacher depends.

Working knowledge, like other cultural forms, is an adaptation to their workplace or environment on the part of practitioners. The 'on the job' learning which increases the worker's effectiveness to manipulate and even transform his environment is the basis for his power. Teachers develop this ability both for survival and satisfaction (Lortie, 1975). A worker, professional or otherwise, must be able to get along with fellow workers, to perform up to the expectations of his colleagues and thereby secure help and cooperation when needed. Everyone should know enough about the social environment to enable him to predict occurrences, prepare for them and perhaps prevent some of them. The person who achieves this competence is the one who is perceived as 'the best' (Kusterer, 1978), i.e.

teachers who can get both fellow teachers and students to obey their will.

Development of this type of expertise demands high personal standards - the person must wish to work to the best of his ability; and extra knowledge - the teacher must develop his expertise beyond entry level. This ability is rewarded by the respect of colleagues and control over the work situation. Working knowledge does, in fact, provide teachers with a technically informed perspective of their work environment. The teacher who hones this skill is more equal than others and is so recognized by his fellow teachers (Lortie, 1975).

Technicians or Pedagogues

Technology is forcing new accommodations with values and causing beliefs to evolve by the creation of new attitudes (Bereano, 1976). While the definitions of technology are various and multilevelled, a commonality of factors does emerge. One dictionary defines it as "the totality of means employed by a people to provide itself with the objects of material culture" (Webster,1966). The inherent manipulative power of technology has not gone unnoticed. In his work "Technology: The Opiate of the Intellectuals", John McDermott refers to technology as "Systems of rationalized control over large groups of men, events, and machines by small groups of technically skilled men operating through organizational hierarchy" (McDermott, 1969, p. 29).

Technology rests in application; technology is for use (Wald, 1969). When we examine technology, and by extrapolation, technicians, we examine "tools, machinery, and applied knowledge and the social/political context within which they are employed" (Bereano, 1976, p. 7).

Pedagogy is defined in the simplest form as the science or art or teaching (Schribner-Bantam Dictionary, 1977, p. 666). A pedagogue is one who is adept at the practice of the science or art of teaching. Few people would define schooling as purely intellectual in intent - the general tendency is to include a variety of socialized goals. This breadth of purpose means that teaching is seen to be, and is judged in terms of, moral, aesthetic, and scientific values all at once (Lortie, 1975). The work processes in teaching, and the products sought by teachers are difficult to measure by several assessment criteria. We refer to teaching goals as intangible and thus underline their insubstantial qualities. Teaching acts are normally assessed in terms of multiple criteria applied simultaneously. The appropriate time to assess teaching outcomes is ambiguous; it varies from one goal to the next. Teachers work with inherently changeful materials; the objects of their efforts, maturing children, are supposed to keep changing after they have been taught.

The teacher's art or science, then "is marked by the absence of concrete models for emulation, unclear lines of

influence, multiple and controversial criteria, ambiguity about assessment, timing and instability of product" (Lortie, 1975, p. 136). It is the teacher's skill in manipulating these inter-relationships and the teacher's insights into them that can be construed as the creative art or science of pedagogy. An apt distinction between the creativity of science and technology has been made by Polanyi who described the difference between the two. While originality is appreciated in both, in science "originality lies in the power of seeing more deeply than others into the nature of things, while in technology it consists in the ingenuity of the artificer in turning known facts to a surprising advantage" (Polanyi, 1958, p. 178).

New technology does create new opportunities for society but it also generates new problems. Whatever the motivation, realization of the opportunities inherent in the new technology will demand changes in social organization - i.e. the ways in which people and institutions are organized to accomplish their purpose (Mesthene, 1976).

In considering the implementation of this new technology in the schools we should reconsider the fact that the goals of education have not changed; have not been redefined by its advent. What is, in fact, being redefined is the teaching profession.

One of the ways of defining a post-industrial society is

through the change in occupational distribution - not only where people work, but the kind of work they do (Bell, 1976). Unless teachers and the education profession in general begin to examine the implication of computerization, the move towards a more technical orientation with its emphasis on quantitative knowledge will continue, and less teaching autonomy will result.

The Effect of Peer Relations

Teachers currently share neither a powerful technical culture, nor collegiality; teachers are characterized by social individualism. However, studies do reveal significant peer relationship effect (Lortie, 1976). The relationships among teachers are complex, ranging from views of fellow teachers as sources of help to sources of annoyance for neglecting to share unpleasant tasks.

There is much variation in the norms among teachers on collegial relationships. While there is some degree of self-isolation on the part of teachers, there is also recognition of the 'good colleague'. A good colleague is friendly, sociable, and open. He does not manifest snobbery or arrogance. But more to the point for this paper, senior high school teachers laid particular emphasis on the technical performance of peers (Lortie, 1975, emphasis added).

Studies showing the advantageous relationship of working

knowledge and peer relationships are well demonstrated (Kusterer, 1978). The worker who becomes expert reaps the benefit of peer respect, gains social and environmental control, and sets his own goals.

If the present division of teachers (computer literate and illiterate) continues, with the above advantages accruing to the teacher with technical expertise, we are, in fact, creating a hierarchy of teachers; and by implication of knowledge.

IV. Implications for the Teaching Profession

There are always delays in adjusting to a new technology, and during this time, adjustment is generally worse than it was before the technical change. To deny the incredible extension of the capabilites of mankind through technology in general, and computers in particular, would be fruitless and dishonest. We now have mechanical slaves to do our bidding; to work miracles unheard of by the ancients (Ogburn, 1976). But we must also be aware that while technology itself may be described as neutral, the changes it causes are either for better or worse. Changes may offer prospects for new opportunities to make the world a better place or they may bring threats that we feel we should oppose.

The technological society in which we live makes special demands on education. Our school curricula have changed from exclusively humanistic to predominantly scientific (Rust,1978). Skills are replaced by technology and people by machines. Technology has brought about an increased emphasis on material things and a corresponding neglect of values (Mumford, 1976). Modern life without the technological conveniences and comforts is now almost unimaginable to western society; our schedules revolve around them; they are, in many cases, dictators controlling our lives (Ogburn, 1976). While few teachers would suggest a Luddite rebellion, those concerned with education must

examine critically the implications of the automation of education.

If the results of the mechanization of industry are relevant to the classroom, the first obvious casualty of computerization will be the student. In the workplace as the machine age replaced handicrafts, the individual worker created only a part of the product. His skill and joy that went with it were destroyed, replaced by routine, monotony, and toil (Ogburn,1976). New and better tools brought material advantages, but they did little or nothing to help the human being to find meaning or values. An education that emphasizes the technological at the expense of the humanistic in a world replete with self-destructive technology, and particularly poor in human harmony seems short sighted at best. A curriculum whose increasing dependence is on socially-isolated and product-divorced activity is positively destructive.

For the teacher, the situation is just as grave. A technological society is not one that merely uses sophisticated technology, "it is one in which human reason is used almost exclusively to the service of instrumental rationalism" (Stanley, 1976, p. 20). We have already seen that the teaching profession is a singularly non-quantifiable enterprise. History, value, purpose are fundamentals in the transmissions currently involved in education. The teacher's task is to consider the student as

the 'whole' person, with a wide span of capabilities and potentialities. Mechanized production is depersonalized production in education no less that in other fields. The final achievement of automated knowledge is automatic man. While many seem to see automation as the climactical fruition of human culture, we are, in fact, adapting ourselves to the limitations of the machines. Education must strive to foster the seasoned values of collective history and individual human experience to discourage society from overvaluing the contemporary, the dynamic, and the novel. The task of the teacher is to work "to make the genuine good derived from the automation of knowledge subservient to the superior, history-laden functions and purposes of human culture." (Mumford, 1976, p. 29). One of the ways of doing this is to preserve the human autonomy that teachers already possess and to regard with informed scepticism the new elite practitioners of the underdimensioned system of the school computer.

BEST COPY AVAILABLE

BIBLIOGRAPHY

Bell, D., The Coming of Post Industrial Society, Basic Books, N.Y., 1973

Bereano, P.L., Technology as a Social and Political Phenomenon, John Wiley & Sons, N.Y., 1976

Boydell, R., in The Sociology of Education, Musgrove, P.W., Methuen, London & N.Y., 1965

Bradley, B., "Let's Do More With Computers Than Study Computers", Learning, Oct., 1984

Brown, R., The Experimental Mind in Education, Harper & Row, 1968

Bruce, A. Jerry, "Psychology & the Computer Revolution", Computers in the Schools, Vol. 1 (1), Spring 1984, pp. 43-48

Buchignani, Walter, "Can You Pass This Test?", The Concordian, Vol. 2, #11, 1985

Burns, Tom R., Karlson, L.e., Veljki, Rus, Work & Power, Sage Publications, London, 1979

Colin, Terry, (Ed.), Using Microcomputers in Schools, Croom Helm, London, 1984

Delamont, N., in The Sociology of Education, Musgrove, P.W., Methuen, London & N.Y., 1965

Esland, E. and Salaman, M., The Politics of Work & Occupations, The Open University Press, Milton Keynes, 1980

Fischer, H., "Computer Literacy Scope and Sequencing Models: A Critical Review of Two Approaches", SIGCUE, Winter, 1984

-----, "Forward?", MUSE Magazine, Vol.7, No. 1, Oct. 1984

Friedson, E., Professional Dominance: The Social Structure of Medical Care, Atherton Press, N.Y., 1970

Hall, R.H., "Components of Professionalism", Paper presented at the Annual Meeting of the ASA, San Fran., Calif., 1967, in Teacher Professionalism, Lam, Y.S., 1982

Harlow, Steve, "The Computer: Humanistic Considerations", Computers in the Schools, Vol. 1 (1), Spring, 1984, pp. 43-49

Harnack, Robert S., The Teachers, Decision Maker & Curriculum Planner, International Textbook Co., Scranton, Pa., 1968

BEST COPY AVAILABLE

Krull, Judith A. & Archambault, Francis X., "A Survey of Teacher Preparation in Computer Education", Journal of Teacher Education, Vol. XXXV, No. 1, Jan-Feb, 1984, pp. 16-19

Kusterer, Ken C., Knowhow on the Job: The Important Working Knowledge of 'Unskilled' Workers, Westview Press, Inc., Colorado, 1978

Lam, Y.S., "Determinants of Teacher Professionalism" in Teacher Professionalism, 1979

Lam, Y.S., "Teacher professionalism profile: A personal & contextual analysis", Alberta Journal of Educational Research, 28(2), 1982, pp. 122-134

Landry, Richard G., "Computers, Cognitive Processing, and Educational Concerns", Computers in the Schools, Vol. 1,(3), Fall 1984, pp. 115-122

Larsen, M. S., The Rise of Professionalism, University of California Press, 1977

Levin, John, "Computers in Institutions of Higher Learning: A Casual Affair or a Marriage of True Minds?", The Journal of Educational Thought, Vol. 18, #2, Aug. 1984, pp. 84-87

Lieberman, Jethro K., The Tyranny of the Experts, Walker & Co., N.Y., 1970

Liebling, C.R. "Creating the Classroom's Communicative Context: How Teachers and Microcomputers Can Help", Computers in the Classroom, Vol.XXIII, No. 3

Lortie, D.C., School-Teacher: a Sociological Study, University of Chicago Press, Chicago & London, 1975

Macklin, Michael, "Teaching Professionalism to the Teaching Profession", The Australian Journal of Education, Vol. 25, #1, 1981

McDermott, John, "Technology: The Opiate of the Intellectuals", New York Review of Books, July, 1969

Mesthene, E.G., "Social Change" in Technology as a Social and Political Phenomenon, Bereano, P.L., John Wiley & Sons, N.Y., 1976

Mumford, Lewis, "The Automation of Knowledge" in Technology as a Social Phenomenon, John Wiley & Sons, N.Y., 1976

Muskowitz, Joy H. & Birman, Beatrice F., "Computers in the Schools: Implications of Change", Educational Technology, Jan. 1985, pp. 7-14

Musgrove, P.W., The Sociology of Education, Methuen, London & N.Y., 1965

NEA, 1967, in School-Teacher: a Sociological Study, Lortie, D.C., University of Chicago Press, Chicago & London, 1975

Ogburn, W.F., "The Meaning of Technology", in Technology as a Social and Political Phenomenon, John Wiley & Sons, N.Y., 1976

Oppenheimer, J., in The Politics of Work & Occupations, Esland, E. & Salaman, M., The Open University, Milton Keynes, 1980

Papert, Seymour, Mindstorms: Children, Computers & Powerful Ideas, Fitzhenry & Whiteside, Toronto, 1980

Polanyi, M., in Alternatives in Education: Historical and Theoretical Perspectives, Rust, V., 1978

Stanley, M., "Technology and Its Critics", in Technology as a Social and Political Phenomenon, John Wiley & Sons, N.Y., 1976

Stein, William & Kachman, William, "Effects of Computer Games on Young Children's Cooperative Behavior: An Exploratory Study", Journal of Research & Development in Education, Vol. 18, No. 1, 1984, pp. 40-43

Schribrer-Bantam English Dictionary, Schribner Books, Toronto, 1977

Stinnett, T.M. & Huggett, A., Professional Problems of Teachers, Macmillan Co., N.Y., 1963

Snizek, W.E., "Hall's professionalism scale: An empirical reassessment", American Sociologist Review, 1972, 27, 109-114

Wald, G., "America's My Home. Not My Business, My Home", Bulletin of the Atomic Scientist, May, 1969

Webster's Third New International Dictionary (Unabridged), Springfield, Mass., C. Merrian, 1966, p. 2348

Welford, Richard J., "Computers & Social Education", Computers in Schools, Vol. 6, #2, pp. 47-49

Winn, B., "Book Review", Journal of Educational Thought, Vol. 18, #1, Apr., 1984

BEST COPY